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ABSTRACT

This report examines the relationship between maternal medication during labor and mother-infant interaction on the third day of life. Subjects were 45 black low-income mothers and their healthy full-term infants. The mothers' perinatal drug history was obtained, and a coded observational schedule was used to record maternal and infant behaviors during two 30-minute sessions on the third day after birth. Results indicated that infants who had been exposed to higher drug levels were more passive and required more responsive effort from their mothers than infants who had been exposed to lower drug levels. The behavior of the more drug exposed infants was more erratic and less continuous, and maternal behavior reflected this by occasional reduction in responsive effort. It is suggested that even relatively low amounts of maternal medication can affect early mother-infant interaction. (GO)

Effects of Maternal Medication on Mother-Infant Interaction: Methodological Considerations

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Effects of Maternal Medication on Mother-Infant Interaction: Methodological Considerations[1]

In the past 15 years several researchers have studied the effects that pain-relieving drugs administered to the mother during labor have on infant behavior. In general, mothers who receive more medication have infants who are less responsive and more irritable in the first few days of life and who habituate more slowly to external stimuli as much as four weeks later.[2] These various behavioral deficits on the part of the infant have led Brazelton, among others, to suggest that early mother-infant interaction might be adversely affected by these drugs. This report examines the relationship between drugs given during labor and mother-infant interaction on the third day of life.

Our initial purpose was to study normative interactions of black low-income mothers and infants. Criteria for selection were: that the infant be healthy and full-term, that the pregnancy and delivery be without complications, and that the mother be given no more than 150 mg of analgesic drugs one to six hours prior to delivery. But even within this truncated population, the amount of drugs administered to the mother correlated with a number of mother and infant behaviors. Therefore, we felt that the effects of maternal medication should be examined more closely.

Subjects then were 45 healthy full-term black infants and their mothers, selected so that there would be roughly equal numbers of multiparas and primiparas and equal numbers of male and female infants.

Three mothers had no analgesic drugs, 10 received only various small amounts of nitrous oxide, three had only 25 mg of a tranquilizer, while

the remaining 29 mothers received various dosages at various times of a narcotic--Demerol--coupled with a tranquilizer--Phenergan, Largon, Vistaril, or Thorazine. All but four mothers had some local-regional anesthesia. Two obstetric anesthesiologists were asked to judge, on a 1 to 8 scale, the overall severity of each mother's drug history. Since 42 or 93% of their judgments were either in perfect agreement or within one scale point of each other, the mean of the two judgments is used here as a measure of drug level.

The procedure was as follows: On the third day of life mother and infant were observed for two half-hour sessions, one at 9 a.m. and one at 4 p.m., during which the mother bottle-fed her infant. One observer recorded mother behaviors while the other recorded infant behaviors. Data were recorded with Datamytes, which are portable electronic digital recording devices. Just prior to the 9 a.m. feeding, the infant was examined for 45 minutes. Here I will report on data recorded during the second observation session. (For a more detailed description of the procedure, see Brown, Bakeman, Snyder, Fredrickson, Morgan, & Hepler, 1975).

The coding scheme used by the observers defined some 100 relatively concrete, relatively molecular behaviors, structured so that both the frequency and duration of behaviors would be preserved. The behaviors selected for analysis here--some 34 altogether--are categorized either as mother or as infant interactive behaviors. Mother interactive behaviors include: mother stimulates her infant to feed, mother wipes milk from her infant's mouth, mother rocks, rubs, or pats her infant, and mother vocalizes to her infant. Infant interactive behaviors include: infant refuses the bottle, infant lets milk dribble out of his mouth, infant trembles or roots in the absence of nipple stimulation, and infant vocalizes.

These behaviors we have interpreted as elements of a communication system, as messages or signals sent by the mother to the infant or by the infant to the mother. Thus we view each observation session as a dialogue, much as other researchers have done, e.g., with adult conversation or mother-infant gaze and vocalization patterns.[3] Each observation session was segmented into 360 five-second bins or time frames. Within each time frame, then, the mother-infant system must be in one of four mutually exclusive and exhaustive states: (1) neither mother nor infant is acting, (2) both mother and infant are acting, (3) only the infant is acting or (4) only the mother is acting.

Now, the flow of mother-infant interaction can be described with a state transition diagram, a diagram which depicts the probabilities with which states will follow each other (see Figure 1). E.g., here the probability that the coacting state will follow itself is .54, and the probability that the mother-alone state will follow the coacting state is .22. This particular diagram summarizes the interaction patterns for all 45 of our mother-infant pairs (probabilities less than .10 are not given).

In general, of course, the state most likely to follow a particular state is simply itself. But beyond that, the quiet state was more likely broken by the mother, while the coacting state was more likely broken off by the infant, leaving the mother acting alone. And once the mother was acting alone, she was more likely to simply stop than to be joined by the infant. This suggests that, in general, the mother initiated, followed through, and completed behavioral sequences. But once the infant was acting alone, his next state--whether the coacting or quiescent one--was unpredictable.

The question now is: how was this typical pattern of mother-infant interaction affected by maternal medication. Factors other than drug level influence interaction, e.g., parity, length of labor, and sex of infant. In order to determine which transitions were most sensitive to drug effects, we first performed path analyses, or what amounts to the same thing--we looked at the partial correlations of drug level with the various transitional probabilities controlling for parity, length of labor, and sex. The path diagram is given in Figure 2.

The results indicate that drug level had no effect on transitions from the quiescent or coacting states, but did have an effect on transitions from the mother-alone and infant-alone states (see Table 1). Figure 3, therefore, includes only those transitions, summarized separately for those mother-infant dyads above and those below the mean drug level.

Maternal medication appears to have affected most who responded to whom. With higher drug levels, it became more likely that the mother would respond to the infant than that the infant would respond to the mother. Further, mothers who received more drugs were more likely to continue acting, but their infants were less likely to continue acting. This suggests that the more drug-exposed infants were more passive and required more effort from their mothers.

From these and other analyses we have performed, it appears that maternal medication during labor affected infant behavior at three days and that drug-associated changes in infant behavior did indeed affect mother-infant interaction. We suspect that the behavior of the more drug-exposed infant was both less discriminable and more ambiguous to the mothe and that their interaction was more erratic. The more drug-exposed infant vocalized less,

had his eyes closed more, was not particularly responsive to his mother, and tended to emit fewer behaviors in general. He was less likely to maintain his behavior, more likely to simply stop acting, and more likely to be responded to by his mother. On the one hand, the behavior of the more drug-exposed infant was not responded to at all, either because its meaning was unclear or because it terminated too quickly. Yet on the other hand, his behavior was responded to more, suggesting not so much increased responsivity as erraticness induced by ambiguity. It appears as though those mothers who received more drugs reacted both too much and too little to their infants.

This is somewhat speculative, of course, but it does suggest that even with relatively low amounts of maternal medication early mother-infant interaction can be affected. Whether there are longer-term effects on mother-infant interaction is as yet an intriguing and unanswered question.

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Footnotes

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[2] See, e.g., Brazelton, 1961; Stechler, 1964; Conway & Brackbill, 1970; Richards & Bernal, 1971; Horowitz, Aleksandrowicz, Ashton, Tims, McCluskey, Culp, & Callas, 1973; Brackbill, Kane, Manniello, & Abramson, 1974; and Aleksandrowicz & Aleksandrowicz, 1974.

[3] See, e.g., Jaffe & Feldstein, 1970; Hawes & Foley, 1973; Stern, 1974; and Vietze & Strain, 1975.

Table 1

Path Coefficients from Parity, Drug Level, Length of Labor, and Sex of Infant to Simple and Transitional Probabilities

Probability	Parity	Drug	Labor	Sex
p(I)	--	-19	47**	34*
p(I/I)	--	-27	36*	20
p(B/I)	--	33*	--	-23
p(N/I)	--	22	-33	--
p(M)	--	--	-22	-39**
p(M/M)	--	25	--	-26
p(B/M)	--	-24	--	--
p(N/M)	--	--	--	24
p(B)	-23	--	--	--
p(B/B)	-25	--	--	--
p(I/B)	--	--	--	25
p(M/B)	24	--	--	--
p(N)	--	--	--	--
p(N/N)	30	--	--	21
p(I/N)	--	--	30	--
p(M/N)	-43*	--	-20	-34*

Note.--Only path coefficients with a p-value of .25 or better are included here.

*$p < .05$.
**$p < .01$.

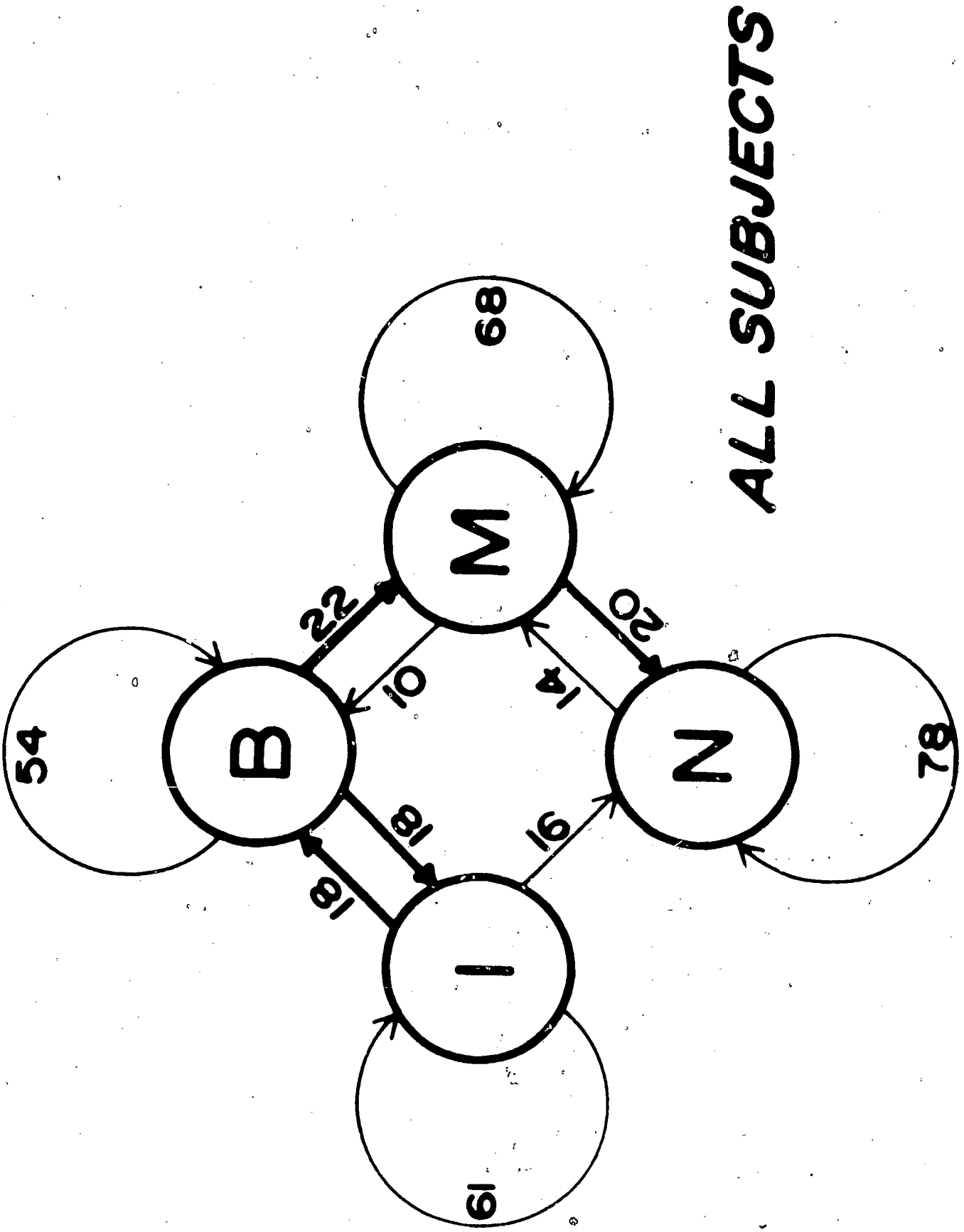


Fig. 1: State transition diagram summarized for all mother-infant pairs (mean transitional probabilities less than .10 omitted)

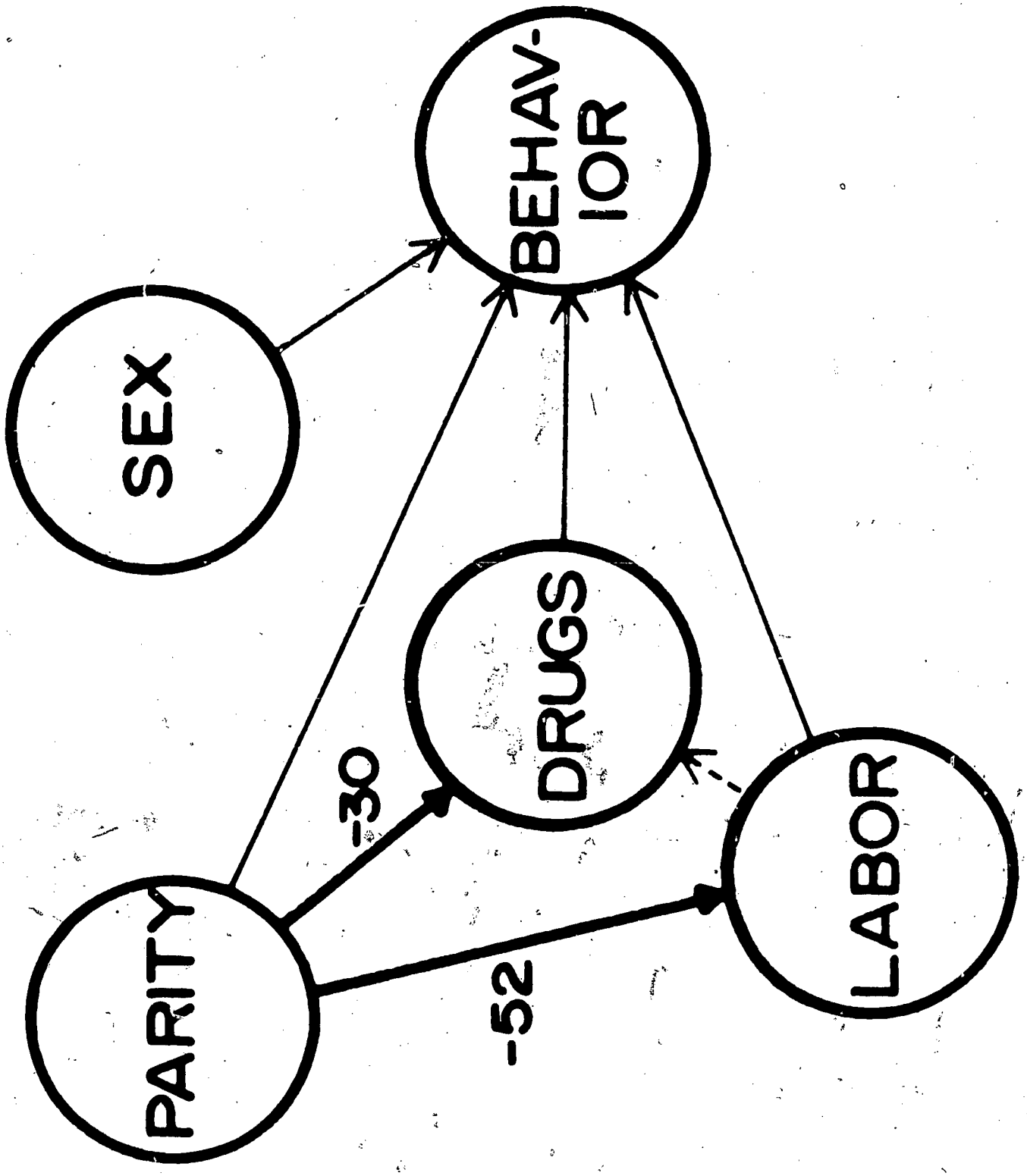
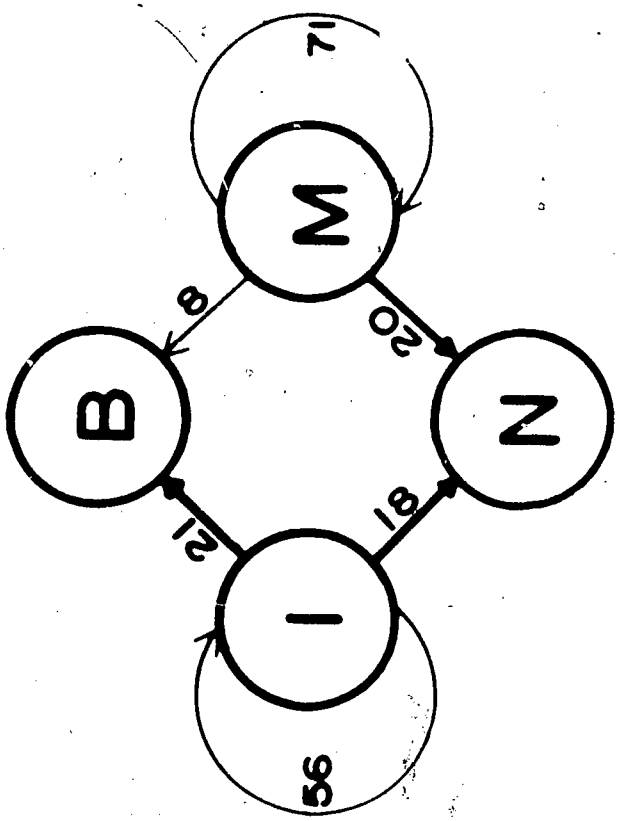
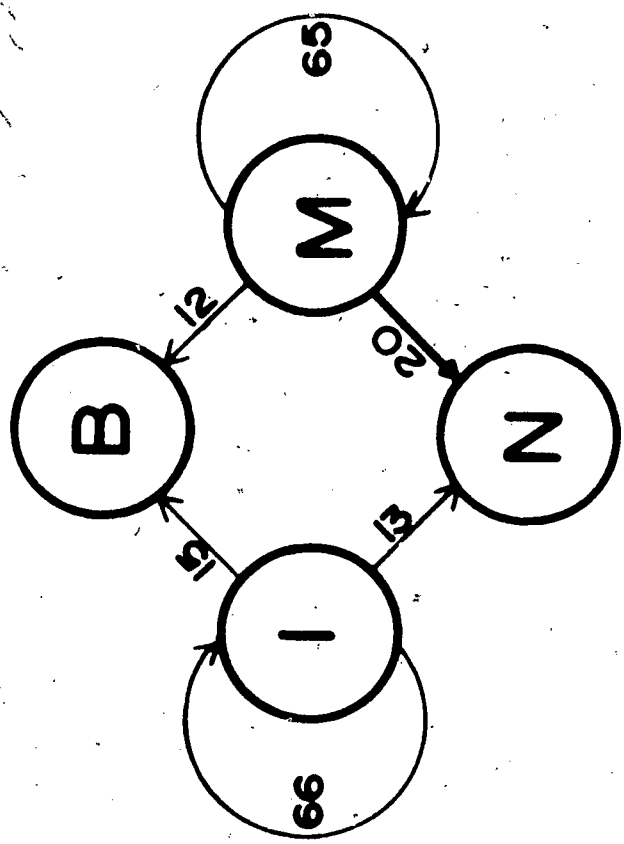


Fig. 2: Path diagram for parity, drug level, length of labor, and sex of infant as antecedents of mother and infant behavior



HIGH DRUG



LOW DRUG

Fig. 3: State transition diagrams for low and high drug groups (mean transitional probabilities less than .10 omitted)